DOCUMENT RESUME

ED 108 875 SE 019 042

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TITLE Suggestions and Procedures in Developing Nature Trails. Revised.
INSTITUTION North Carolina State Dept. of Public Instruction, Raleigh.
PUB DATE Sep 74
NOTE 34p.; Listed as Appendix E of SE 019 043; For related documents see, SE 019 041 and 043

EDRS PRICE MF-$0.76 HC-$1.95 PLUS POSTAGE
DESCRIPTORS Art; Conservation Education; *Educational Programs; Elementary Secondary Education; Environment; *Field Instruction; Instructional Materials; *Interdisciplinary Approach; Language Arts; Natural Resources; Outdoor Education; Sciences; Social Studies; *Teaching Guides; *Trails
IDENTIFIERS *North Carolina

ABSTRACT

Though public nature trails have been in use since the late 1800's, their use on school grounds for educational purposes is a relatively new concept. The nature trail is an important tool for teaching environmental awareness and appreciation. It provides experiences for observing nature firsthand with all senses employed. It is a resource that is available to the entire school and is applicable to all curriculum areas. The purpose of this booklet is to provide information for teachers, administrators and students on how they may plan and develop a nature trail at their school. Locating the trail, trail construction, trail interpretation, and maintenance are covered in section 1. Section 2 focuses on art, science-math, language arts, and social studies activities which could evolve from classroom use of the nature trail. Section 3 provides ideas and examples of trail topics such as a marsh trail, historical trail, wood trail, and geology trail. Examples of outdoor demonstrations and charts are also included in this section. Section 4 is a list of environmental education sources and aids including associations, books, magazines, films, and resource people. The booklet concludes with a list of outstanding nature trails located in North Carolina. (Author/TK)

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SUGGESTIONS AND PROCEDURES IN DEVELOPING NATURE TRAILS

OUTDOOR RECREATION AND APPLIED ECOLOGY I 7060

OUTDOOR RECREATION AND APPLIED ECOLOGY II 7061

SE 019 042

DIVISION OF OCCUPATIONAL EDUCATION

AGRICULTURAL EDUCATION SECTION

DEPARTMENT OF PUBLIC INSTRUCTION

RALEIGH, NORTH CAROLINA

REVISED

SEPTEMBER 1974

PREFACE

The purpose of this booklet is to provide information for teachers, administrators and students on how they may plan and develop a nature tail at their school. This nature trail will be one of the teaching-learning stations for "Outdoor Recreation and Applied Ecology" and will be an integral part of the course of instruction.

Fortunately, little expense is required for this excellent educational resource and consultation help is available from: State Department of Public Instruction, Division of Occupational Education and the Division of Science; State Museum (Raleigh); Environmental Education Center, (Oteen); The Soil Conservation Service (Raleigh); The Wildlife Commission (Raleigh); Archives and History Commission (Raleigh); The N. C. Extension Service (Raleigh).

We are especially appreciative to the following persons who are most responsible for materials in this booklet:

(1) Alan Lenk, Environmental Education Center, Oteen, N. C. for the materials through page 11, quoted from his publication, entitled, "Developing OnSite Nature Trails."

(2) Eugene Upchurch, State Museum, Raleigh, N.C.

(3) Mitchell Clary, District Soil Conservationist, Waynesville, N.C.

(4) Elmer Graham, Soil Conservation Service, Raleigh, N.C.

(5) Luther Partin, Wildlife Commission, Raleigh, N.C.

(6) Dr. Larry Liggett, Director, Environmental Education Center, Oteen

(7) Paul Taylor, Director, Division of Science, State Department of Public Instruction, Raleigh, N.C.

Teachers and students may add other stations that may be applicable to their geographical location. Also stations may be added as part of the teaching laboratory for other courses as: pulpwood estimation of timber estimation, tree height, ornamental plant as well as hardwood and softwood tree identification for companion courses of Forestry, Pulpwood Production or Ornamental Horticulture.

It is hoped this booklet will be help in planning and laying out a nature trail.

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FOREWORD[1]

That there is a growing concern for the welfare of our spaceship earth can be seen by increased membership in conservation organizations, government agencies to monitor pollution and enforce controls, legislation to crack down on major industrial polluters, pollution control devices for automobiles, and the return of the two-way pop bottle.

These measures are being taken to rectify the damage man has done to his planet and to reshape this country's pollution nightmare into the dream of clean water and clean air for future generations.

The present system of general education has not taught an environmental ethic, a feeling for our mother earth that promotes wise us of our resources and a concern for environmental quality. For this reason, there has been a recent emphasis in ecological education in the classroom, and more importantly, perhaps, a push to involve students in learning experiences outside of the classroom. A nature trail located on the school grounds is one way of providing for an outdoor experience at most schools.

Though nature trails for public use have been around since the late 1800's, their use on school grounds for educational purposes is a relatively new concept.

The nature trail is an important tool for teaching environmental awareness and appreciation. It provides innumerable experiences for observing nature firsthand with all senses employed. It is resource that is available to the entire school and is applicable to all curriculum areas.

Bryon Ashbaugh, the author of TRAIL PLANNING AND LAYOUT, published by the National Audubon Society, lists these positive features of nature trails as they contribute to the following areas:

Education--provides a stimulating location for learning about the environment. Stresses the scientific method as an educational approach to the solution of environmental problems.

Conservation--provides firsthand examples of cause-and-effect relationships between man and his environment. Calls attention to both problems and solutions in managing natural resources through employment of good conservation practices.

Interpretation--provides realistic examples of the interdependence between living things and their environment. Nature is permitted to "speak" more directly and forcefully.

Research--provides an opportunity for a systematic inquiry into the outdoors through observation and experimentation.

Direction--introduces nature and environmental subjects to the beginner in logical sequence, thus providing for a more stimulating and rewarding experience.

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[1] The foreword and through page 11 are quoted from the publication entitled, "Developing On-Site Nature Trails," produced by the Environmental Education Center, Oteen, N. C. and edited by Alan Lenk.

Inspiration--provides firsthand experiences for maximum motivation and creative expression.

In addition to the educational value of nature trails, they are inexpensive and can be constructed in a short period of time.

The remainder of this booklet is devoted to the steps and considerations involved in establishing a trail.

TRAIL PLANNING AND DEVELOPMENT

Locating the Trail

Few schools have planned, as a part of their campus, a portion of the grounds to be left in a natural state. But fortunately, numerous schools in the western part of North Carolina have on their property some wooded area that is suitable for a natural study area. Only the most crowded urban schools have been left without such an area, and ironically it is these schools that would probably benefit the most from a nature trail.

It is this wooded area then, so often considered "wasteland" that is ideal for a nature trail. When locating the trail, these things should be kept in mind:

1. As mentioned, a wooded area provides the most potential for a trail, because more points of interest are likely to be found in the woods.

2. When a likely area has been idenified for the inclusion of a trail, it is very important to walk over the area and become familiar with its natural features. Make an inventory, and perhaps a rough map noting things such as:

   a. fallen logs

   b. tree stumps

   c. fungi growth

   d. moss carpets

   e. tree species

   f. wildflowers

   g. fern beds

   h. animal dens

   i. animal trails

   j. bird nests

   k. insect activity

   l. rock exposures

   m. streams

   n. marshes

   o. wood piles

   p. old road beds

q. fences

r. animal tracks

Lucky is the school setting that has all of these points of interest. Most areas have many of them, however, and the problem will be to decide on which features to capitalize. A life science teacher or someone familiar with natural history can easily spot the kinds of things listed above. (A convenient checklist is included in the appendix).

3. The features noted in step #2 will, in a sense, help plan the actual route of the trail Certainly the trail should try to incorporate many of the area's interesting and outstanding features.

Trail Layout

With an idea of the unique features of the area in mind, one can begin to design a path that will use these features as focal points to a better understanding of nature. Here are a few ideas concerned with laying the trail out:

1. Most trails are in the form of a loop, or near circles; they usually end near where they began.

2. Trails should be winding. This suggests anticipating what is around the next bend. Trails should avoid having long straight stretches.

3. The trail length will depend on the amount of space available and the desires and wishes of those involved in its planning.

4. Trails should be one-way with a definite starting and ending point.

5. If land is abundant, a figure eight trail has the versitility of providing two trails in one. Use one half of the eight as the standard loop trail, and the entire figure for longer teaching purposes or activities. Yet another trail design is the spur trail, leading from the main route to a special point of interest and back again.

To lay out the tentative trail route, pieces of string or cloth are helpful as guide markers.

Trail Construction

With the trail marked off through the woods, the next step is to clear the path. In a reasonably mature wooded plot, dense undergrowth should not be a problem to clear. On the other hand, some areas may be choked with underbrush. Clearing will most likely be done by hand, and great care should be taken not to remove or destroy anything that is valuable.

Since it is desirable to have the trail wind about, little has to be cleared in the way of trees, large shrubs, or very dense undergrowth; one can simply go around these obstacles. Going over the trail with a power lawn mower is a good way to establish the trail. If the trail is too steep and

rugged to be traveled over with a lawn mower, chances are it is not suitable for comfortable nature trailing.

Other construction considerations that are worth keeping in mind are:

1. It is better that a trail's width be a little too wide rather than too narrow. Students on the trail tend to travel in a group. Also, when stopping at points of interest, it is nice to have room to gather together. Enlarging trails at points of interests will help eliminate trail overflow.

2. Brush and logs cut when clearing the trail provide good wildlife habitat. Leave some in piles along the trail.

3. A trail may invite erosion. If this be the case, erosion control plantings and water diversion devices should be employed immediately.

Interpreting the Trail

Many people are not especially excited by looking at plants or seeing the signs of animal activity in the woods. Appreciation for such things grows through understanding and familiarization with the subject. Here lies the task of interpretation; bringing those things of interest seen along the trail, and the students together, and to make the students aware of the significance of these features. Trail interpretation has been defined as "the problem of bringing the subject matter and audience together and to communicate information and understanding that will make the walk enjoyable and appreciating."

Those features identified earlier, the mosses, ferns, etc., are the things worth interpreting. Other things governing the kind of interpretation a trail may have, are:

1. The course of study of the class that will be using the trail. A life science class may wish to emphasize plant and animal life and their interrelationships.

2. The outstanding or dominant features of the trail or trail area, as a thick pine forest or plants along a stream.

3. The special interests of student and teacher.

4. Age level of the students using the trail.

Interpretation of the trail can be handled several ways. Some resourceful teachers can help their students understand the intricacies of nature with little help from anyone. On the other hand, there are teachers who may be interested in having a trail, but do not feel comfortable teaching nature lore, or understand how they may utilize the trail An interpretive booklet, similar to a self-guided nature trail booklet found in National Parks and recreation areas, can be written for the particular trail developed. The booklet corresponds to the special features of the trail and helps explain them. These special features are marked by a signpost or strip of bright colored ribbon, and may be though of a specific stations along the route.

Two examples of interpretation are given below:

A rotten tree stump and a holly tree are just tow of the many features that can be found along nature trails. They may be interpreted in many ways. The following are two examples:

1. Station # 3 A ROTTING TREE STUMP

   How has the removal of this tree affected the forest community?

   Any change in the forest, such as the removal of a tree by logging, affects other living things that are associated with the tree. The squirrels that live there have to find new homes and a new source of food. The cool shade that was once there has been replaced with warm sunlight, which is favorable for grasses and briars that now live here. All things in the forest community are interrelated.

   This kind of interpretation is conceptual in nature. Variety is added to interpretation if concepts are sprinkled between mere identification of the holly tree for example.

2. Station # 7 A HOLLY TREE

   The American Holly Tree is a common evergreen of hardwood forests. It likes moist soil and is often found near streams or river bottoms. Notice the waxy leaves, tipped with sharp spines. Some trees bear red berries that provide food for the many songbirds. Try to spot other holly trees along the trail.

The number of stations included in the interpretive text will depend on the length of the trail and the potential of the are being interpreted. More stations can be put at the beginngin of the trail, when motivation is high, and then spaced farther apart towards the end. The average school trail may have between then (10) and twenty-five (25) stations.

Some general rules concerning interpretive texts are to keep them relatively simple and try to get across one main idea at each station. Interpretation may follow a theme that is evident at each station throughout the trail, or each interpretation may be independent of the others.

Maintenance

Relatively little maintenance is required for a school nature trail. Station markers along the trail should be kept intact at all times. Any litter along the trail should be removed at once. An occasional mowing in the fall or spring will keep unwanted plants from growing in the trail.

It is hoped that the interpretation offered by a leaflet adapted to stations along the trail, and the nature trail itself, will only be the beginning of outdoor study. (A list of outdoor activities applicable to nature trails is found in the appendix).

Ultimately, the success of a nature trail and outdoor education will be decided by the teacher. A nature trail can only add impetus to the concept that a respect for the environment is best taught by direct contact with that environment.

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SIMPLE AS A B C

ARTICULATION

HOW TO USE NATURE TRAILS

ARTICULATION - HOW TO USE NATURE TRAILS

Objectives

The nature trail at the school serves as a guide to bring students, teachers, and school administrators into a healthy and voluntary contact with with nature.[1] If properly used, the nature trail can be an extension of the classroom, to help abstract ideas from books become concrete facts from experiences.[2] (Landscapes are like books which inform us about the condition of our environment. Learning how to read them is a matter of finding out what to look for and how best to interpret your findings.)

Extract from "How To Teach Science Through Field Studies" by Millard C. Davis.

Reasons for using environment:

1. Favorable attitudes toward the environment and informed participation in the environment may be attained when students understand ecological principals illustrated in the environment.

2. Field studies help develop an aesthetic appreciation of our natural environment and a desire to keep it beautiful.

3. Recreational and attitudinal values are developed through study of environment.

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[1] Wilcox, Arthur T., "Nature Trail Outline." Park Education Program, MSU.

[2] Davis, Millard C., "How To Read The Natural Landscape In Forests and Fields," National Science Teachers' Association.

* Patterns in nature. A careful eye can see many different patterns in nature. A vine grows in a spiral around a tree. The annual rings in the cross-section of a cut log form concentric circles. Have students try to find patterns along the trail that take the shape of circles, spheres, concentric rings, squares, triangles, etc. They should record the object from which they got their findings with others.

* Making rubbings of objects is a popular and enjoyable art form. Simply stated, it involves placing paper over an object to be rubbed, then moving a crayon or similar instrument back and forth over the paper so that an image is formed. Have students make rubbings or textures found in the woods. Let them make texture collection, using rubbings, of different trees. Write on the finished rubbing the kind of tree used. Display aroung the school.

* Take students on a silent walk through the woods. At a given signal, everyone is required to stop and listen for one minute (assign the child with a watch to be a timer) How many different sounds can be heard on the trail at different listening points? How are some sounds like others, and how are some different and unique? Do some evoke certain emotions? A portable tape recorder will add interest to the whole affair.

* A dogwood blossom by any other name smells the same. Make a list of all the different smells that come your way as you walk through the woods. See if you can discover the source of the odor and identify it.

* Have students lead each other blindfolded over a level portion of the trail. Have them discuss or write about what they "saw" blindfolded.

* Before going outside, compose a "touch list" with the students. These are words that describe how things feel, as with the word "rough". With a list of several such words in hand, the mission is to find objects in the environment that these words describe. For example, the word "rough" would match up with bark of an oak tree. This would be recorded as: rough - - bark of oak, and so on for each descriptive word on the list.

Activities That Involve Writing Skills

* A good subject for a story is a treehouse. Students can compose a short story around some aspect of a treehouse, or the inhabitants and their lives.

* For use in descriptive writing, have students pick an object to study along the trail. Have them examine its every detail, and store what they have seen in their minds. Upon returning to the classroom, they are to write a poem or descriptive paragraph about their subject. It will be interesting to see how much detail they remember, and how interesting they make their compositions. The seemingly simple objects in nature offer the greatest challenge to the writer.

* A bird's eye view of the world is entirely different from ours. We always are looking up at trees; birds often see them from above. We walk between tree trunks, and they hop from limb to limb. Let the student's imagination fly away, and suggest they compose s story from a bird's eye view. What is life like from the perspective of a bird's world?

* Trees are the longest lived and tallest life forms on earth. Within the course of 100 years of life, trees "see" many changes around them. Many fall victim to clearing and logging. Let students write about my "My Life As a Tree, 1855-1972", and suggest they relate experiences in "their" lives.

* If there are sawed logs in the area or tree stumps left from logging, assign a group of students the task of aging the tree by counting the annual rings. Have them consider things like the size of the tree when they were born, or its size when the school was built. Rings that are close together, indicate a year of slow growth. Have some students check to see if close rings coincided with a dry year in the area.

* Trees are the dominant plants in the woodland areas. A point of discussion can be centered around how man interacts with trees (trees produce oxygen and we exhale carbon dioxide). What other ways does man interact with trees? (Building materials, foods, synthetic materials derived from trees, turpentine, etc.,)

* How do trees interact with animals found in the woods? Have students divide into groups to observe the animals they see in and around trees. Remind them to look at the entire tree from the ground up. Keep a list of any animals, from insect to raccoon, and the group that has observed the most associations wins.

* In the spring of the year, have students transplant plants from around their homes to the nature trail area. They should record how the plant progresses, if it grows at all. If their transplanting is unsuccessful, suggest that perhaps the new environment may not have been favorable for the plant's growth. Did the area where it was uprooted from match the area into which it was transplanted?

* Chances are that near the trail, or on a roadcut near the school, there will be a plant call kudzu. This broad leafed, vine-like plant used extensively by highway departments to cover roadbanks and prevent erosion, has now become a pest in many areas. It has the capacity to engulf a forest and literally cover up trees depriving them of light. The unexpected effects of this plant forms a good basis for discussion on man using certain plants in new areas for new uses when he does not fully understand how the plant lives and grows. An example with animals in the Starling, a bird first introduced in New York.

* An activity involving measurement is to see which trees have the largest canopy of foliage area. Students can walk around a tree directly under the outmost limits of the farthest branches. The diameter can be measured with a yardstick, and the are figured by the formula $A = r^2$.

* Investigate how a grasshopper jumps. Measure the distance of five jumps, See if the angle of take off can be determined. Different grasshoppers jump different distances. Calculate jumping distances for two or three species. Become an expert on "hopper hopping."

* To an interested student, assign the task of finding out what animals compose the food chain of the local area. With a piece of paper in hand, he should record every animal that he sees. Then arrange the animals (and some plants, perhaps) into a workable food chain, using the list of animals seen, and arrows to indicate who eats whom. An example of a simple food chain is: blade of grass → grasshopper → small bird → red tailed hawk. Later, transfer the information to a larger piece of paper for display and explanation.

* Acquire a few thermometers and let a group of students check temperatures at various places on the school grounds. Comparisons should be made between

* one location and the next. Some of the areas they might check are: on the playground, in the woods, next to the school building, an inch under leaf litter, on the shaded side of a tree and sunny side of the same tree.

* If a stream flows through the school grounds, have some students find out where it comes from and where it is going. If a small plastic boat were to be placed in the stream, which waterways would it flow through on its journey to the ocean. Maps will be needed for this one.

Social Studies Activities

* Have students draw up a land use ordinance. This nature trail "Bill of Rights" will decide how the nature trail is to be used and protected. Guidelines on collecting specimens, rules on littering, and conduct are things to include.

* After the students have become thoroughly familiar with the nature trail and the surrounding area, use any medium available (clay, paste, paper mache, etc.,) to make a relief map of the area and trail. Some students may want to make different kinds of maps of the area.

* Have students survey the area with the idea of trying to discover how the land may have been used in the past. Since the area will not be a virgin forest, one knows that the forest must have been logged at one time and is now recovering. Fence rows, rock piles, perhaps the remains of a house foundation, are clues to the history of the area.

* Somewhere along the trail there are likely to be ants or termites. These insects have social structures that are highly organized and regimented. After some research at the library and actual observation on the trail, students can compare the insects' social structure to the social structure and government that we live under.

* Let a group of students write and plan a puppet show at a study site on the trail using animated characters such as animals, flowers, trees, etc. Put these characters in a situation where there habitat is threatened by a forest fire or highway right-of-way and have them express their feelings to the audience.

* Show the students some of the building designs by architect Frank Lloyd Wright. Then let them design a building that will be built in the nature trail area, but it must blend into the surroundings as much as possible. It may be a home or an apartment house. Organize a judging committee to decide on the best design.

* Are the animals that live in the woods around the school, the same animals that have always lived there? Are there any that were once native to the area but have become extinct? Have there been new animals introduced? For anyone interested in hunting or endangered species, these questions may be of interest.

STATIONS - EXHIBITS AND DEMONSTRATIONS

A NATURE TRAIL is one of the most effective methods or providing opportunities for learning experiences in the outdoors. Where possible a trail should be included and will probably be the dominant feature in most outdoor classrooms.

Following are some ideas and examples being used in other areas that may be useful to you.

Geology Trail Helps to explain the composition of the earth's surface and how its various features were developed. It contains a geology wall which is simply a stone wall topped by large specimens of the principal rocks and minerals found in the area.

Brook Trail Follows a stream to point out such things as the action of water as a soil builder, the power of water in soil erosion, and importance of the surrounding watershed. It illustrates several types of habitats for plants and animals and leads past such watery environments as rapids, slack water and pools.

Water's Edge Trail Follows along the edge of a large pond, lake, or river and points out the transition between and water. In the case of a small pond the trail could go around the body of water and over it by means of a raised walkway and bridge which would permit extensive observation without destruction of the habitat.

Wood Trail Shows by states, the natural steps in plant succession, particularly from an open area or glade to climax forest. It also leads past forest types which exhibit certain characteristics of light tolerance; e.g. sun-tolerant hardwood to shade tolerant types such as hemlock and white pine.

Timber Trail Leads through deepest and oldest woods. Leads past heavy timber and points up the improtance of natural forest cover in watershed protection -- also mature and straight trees as producers of timber. Trail should lead through areas under forest management and past sites that explain the importance of forest protection, fire prevention, and the effects of shade, humidity, and temperature upon forest growth.

Soil Trail This trail is chiefly designed to illustrate the various factors in the formation of soil. It also show the effects of thawing, freezing, and weathering on soil. It shows how lichens, mosses and ferns, grass, shrubs and trees, and animals affect the soil land area related to it. A soil profile is especially useful.

Animal Shelter Trail Shows homes, nests, and dens of wild animals. During proper season the trail leads past features which tell the story of hibernating animals. Nest boxes for different species can be erected in areas of suitable habitat.

Farm Trail Leads past cultivated lands showing good farm practices. Such features as stripcropping, contour furrowing and cultivation, crop rotation, terracing, soil cover, etc., are all excellent soil conservation practices that should be demonstrated to the visitor.

Marsh Trail An exciting trail that takes the visitor alongside and through as well as over a marsh. The later can be done by a footbridge. Here, through proper signs or explanation by a guide, the fascinating story of the relationship of land to water levels can be told.

Historical Trail This trail takes advantage of such manmade activities as mines, furnaces, charcoal pits, sawmills, battle fields, and Indian villages. It relates the history of the area to man's use of the local natural resources.

OUTDOOR DEMONSTRATION AND CHARTS

Bird Feeder and Bath Area Many people travel long distances by car or afoot to see birds. Yet, you can bring birds to your nature center or home by providing them with water and the right kinds of food. Such a bird cafeteria would be ideally situated if it were placed outside a picture window at the main building. It is now a feature at several nature centers.

Nature by the Square Yard A small square plot of ground (one yard square) can be fenced in an open field, edge of woods, or in deep woods. Here the different kinds of plants can be identified by using a crossbar with labels above the plot, with strings from each suspended label leading to a peg beside the plant described.

Snake Pit Beds of concrete and stone can be constructed to form a circle 20 feet in diameter, with a rail fence to keep visitors back at a safe distance. The pit should have inverted walls and contain a water-filled moat to prevent the snakes from escaping. A stone island, 8 feet in diameter provides a place for the snakes to sun themselves and be observed. This exhibit can play an important role in demonstrating the value of snakes and the difference between poisonous and non-poisonous varieties.

Turtle Pond This includes a shallow pool with islands of stone and cement. Overhanging rocks are carefully placed and cemented together so as to provide an insurmountable barrier to the turtles, thus eliminating the need for a wire fence.

Geology Wall This is simply a low stone wall with various local rocks and minerals cemented on top and properly identified and labeled with nearby signes. Fits in very well along a geology trail.

Observation Platform This is merely an elevated wooden or stone structure where individuals and groups can gain a clearer view of the local countryside. It can also be used for bird study by day and for astronomy studies at night.

Botany Pool A 6' x 15' pool can be cleared out in a wet area and certain aquatic plants attracted to it or planted for special study. These include water lilies, cattails, pickerel weeds, arrow leaf and rushes, with liverworts and others water-loving plants along the edges. This pool could be part of the water's edge trail.

Soil Profile A profile showing the different layers of soil can be demonstrated with a pit to be dug in cross-section fashion at the side of a bank. The various layers of soil that can be shown include:

"A" horizon - a darkly colored layer containing a relatively high content of decayed plant materials mixed with mineral matter. This horizon may be missing due to erosion.

"B" horizon - layer in which the more soluble minerals accumulate as they wash down from above to meet the weathered and broken parent material.

"C" horizon - paren material -- may be bedrock or glacial deposit which has been relatively unchanged.

Tree Stump A sloping cut on top of a tree stump could be smoothed and waterproofed. A simple method is to repeatedly paint the exposed surfaces with *Polyglycol E 1000 (Dow Chemical)* and *(Monsento)* solutions. The two preservatives should be used alternately with drying time between each application.

Bee Tree A bee tree can be created at a nature center by placing a swarm of bees in the natural crevice of a hollow tree, if a wild bee tree cannot be found. In this type of project, it might be possible to get technical assistance from a professional beekeeper.

Plant Succession This is a demonstration area showing the various stages of plant succession, starting with a clear-cut or denuded plot of ground going all the way to the higher stages of tree growth. The important stages to be shown are:

1st stage - for a short period of years, annual and perennial weeds and grasses.

2nd stage - shrubs such as sumac, birch, sassafras, blackberry, and cherry, would grow and condition the soil still further.

3rd stage - trees such as red maple, tulip, and pines would grow and provide shade necessary for the next stage.

4th stage - oaks and hickories. with some beech and ash, would grow and continue to reproduce themselves unless prevented by fire or man.

Weather Station Demonstration A complete weather station is extremely important in helping to interpret the weather of the area and is a worthwhile complement to the equipment of most schools. The station provides valuable local and up-to-minute information to many groups in the community. The U. S. Weather Bureau has established cooperative weather stations in many parts of the country by providing instruments and housing. It is possible that this would be done for your community as a part of a center's program because of the importance of local weather information.

Shelterbelt Demonstration A suitable area can be planted with willows or pines to demonstrate the shelterbelt protection on wet and dry sites.

Grass Demonstration A special plot of ground can be seeded to various types of erosion control grasses. These should be properly labeled and described.

Photographic Blind Several blinds can be constructed to native materials overlooking different habitats for special observations, study, and photography. Good places for blinds are shorelines, mud flats, marshes, ponds, and bays.

Elevated Walkway A walk constructed on driven poles can carry observers over a marsh, mud flat or water's edge. This permits extensive observation of the littoral zone by many people without any destruction of the habitat.

Soil Samples A sample of local soils can be put into bottles with a chart showing sources and values.

Insects of Area Collection of mounted specimens along with charts of life histories.

Grafting Demonstration A grafted tree or shrub can illustrate the dramatic method of tree propagation, which is fast beoming a lost art.

Garden Plots Youngsters can be taught some basic skills in soil preparation, plant propagation, cultivation, and harvest by observing a small growing garden. All work can be done by the children through prior planning and arrangements.

Christmas Tree Plantation Plot can be planted to Christmas trees such as Scotch Pines. This area can be worked by local teenagers thus teaching them something about forestry.

Overlooks Natural observation points can be cleared or marked from which to view natural features, conservation practices, and historical settings.

Council Ring This is a small assembly area made up of logs where a group can be seated and given instructions on the local natural features of the center. Logs should be placed in a semi-circle with a short log at the base for the instructor. The council ring can also be used for campfire programs.

Honey Bee Chart This is an outside chart telling the life history of the honey bee, including the bee's technique of making honey and wax. An observation beehive would be part of the exhibit.

Forest Apartment House Chart A simple outside exhibit can be made which shows, in chart form, how a forest is much like a five-story apartment house. Chart shows soil, mosses, ferns, and wildflowers, shrubs, and trees. From the humus on the ground to the leaves in the highest trees, animals of different types find food, shelter, and homes.

Insect Homes Chart An outside exhibit with chart can show the various types of insect homes. Where possible, natural materials should be used.

Soil is Alive Chart This is another outside chart displaying the live things found in one cubic foot of soil. The various plants and animals can be preserved and shown in jars.

Wood Types A board mounted with pieces of wood from different species of trees is helpful in teaching differences in woods and uses (hardwoods, softwoods, grain patterns, etc.)

Tree Growth Cross-section cut from trees of the same age but of different sizes can be helpful in showing differences in growth due to competition, site, etc.

Plant Mounts A file of plants, leaves flowers and fruits mounted on cardboard under adhesive, clear plastic is useful in teaching the species commonly occurring in the area. Callulose acetate plastic sheets ~.005" in the thickness mounted on white cardboard with a relatively "slick" surface for good adhesion makes a good mount. The cardboard must be sufficiently thin and pliable to take the impresison of thick portions of plants. A type that has been used successfully is ~.018" thick.

Following is a list of publications available for study:

Ashbaugh, Byron L., "Trail Planning and Layout," pp. 101, National Audubon Society, 1130 Fifth Avenue, N. Y. 10028, 1965, Price $2.50.

Shoman, Joseph J., "A Nature Center for Your Community," pp. 40, National Audubon Society, 1962, Price $1.00.

Shick, Harold, "Nature Trails," Circular E-10, pp. 6, Cooperative Extension Service, Michigan State University, East Lansing, Michigan.

Conservation in Miniature Exhibit Demonstrate conservation principles. On a slope of 10 to 15 percent, six or eight 1/100 or 1/200 acre run-off plots can be laid out (measuring 10 x 40' and 4' x 20' respectively). Boards are used to separate the plots and a catch basin is constructed at the bottom of each plot to trap any soil that moves with the run-off water. Various plants are planted in the plots to demonstrate the soil-holding capacity of each. The main plots to demonstrate are: 1) no cover, 2) gras 3) row crops on contour, 4) strip crops, 5) straight rows, 6) diversion terraces.

Pioneer Implements Hundreds of old turning plows, harrows, corn planters, and many other implements are stored in sheds in practically every county in the country. Many could be obtained at little expense. These would be useful in teaching history and social studies.

Erosion Control Students can undertake various erosion control projects on trails, steep slopes, stream banks, etc.

Stream and Watershed Points of interest might include the action of water as a soil builder, the power of water in soil erosion, the importance of the surrounding watershed, several types of habitats for plants and animals and such watery environments as rapids, slack water, and pools.

A stream is an ideal illustration of a miniature watershed. Discussion points might include the area of the watershed and how rain falling within the watershed runs into the stream while that falling outside the watershed boundary runs into other waterways. The cubic feet per second flow of the stream, the retardation of runoff by vegetation in the watershed, the movement of soil by the stream and deposition of the soil in slack areas where the water slows down are important points of interest. In the area of deposition, attention can be directed to the fact that the heavier soil particles are dropped first and lighter particles last.

Sundial The basis of time and other facts in astronomy can be illustrated by an inexpensive sundial. The construction of a sundial is an ideal project for children since one can be easily built from inexpensive materials. Complete directions and plans can be found in Circular 402, Sundials, U. S. Government Printing Office, Washington, D.C. 20402 Cost is 5¢ per copy.

Southern Alamance H. S. - Alamance County

NATURE STUDY IN A SUMMER RECREATIONAL PROGRA

OBJECTIVES: To develop awareness
To develop sensitivity
To have fun

It is suggested that activities be kept simple, that participants become involved, and participants be made aware of what they should observe and/or learn in a session.

SOME ON-SITE ACTIVITIES

1. Simple Observation
2. Bird Watch
3. Wildlife Watch (other than birds)
4. Quadrant Studies
5. Nature Films -- N. C. Wildlife Resources Commission
   Raleigh, N. C.
6. Tree Identification
7. Hikes
8. Outdoor Cooking
9. Use of Fishing Equipment (Demonstration)
10. Safe Gun Handling (Demonstration)
11. Tent Pitching (Demonstration)
12. Other Camping Equipment, i.e., stove, lantern, open fire, Point out safety practices.
13. Erosion
14. Erosion Control
15. Soil Profile
16. Rock Formations (land and water)
17. Plant Succession
18. Forest Floor
19. Different Environments
    a. Upland (hills)
    b. Bottomland
    c. Swamp or marsh areas
    d. Streams and lakes
20. Plant Identification
    a. Poison Ivy
    b. Virginia Creeper
21. Read Aloud Sessions
    a. The Lorax, Dr. Seuss
    b. Etc.
22. Resource People

The Ecology classes have been working this year on a nature trail for Crest and neighboring schools. We hope you will be able to bring your classes to visit the Nature Trail.

We think the Nature Trail will provide:

(A) The opportunity to develop an awareness of the ecological relationships which exist among living things.

(b) Students and other interested individuals and/or groups the opportunity to experience nature through direct contact with the environment.
(C) An opportunity to develop sensitivity and appreciation of nature.
(D) The student with building blocks for his or her individual "Save the Environment" program.

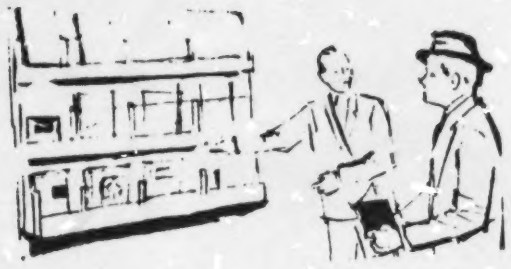
The Nature Trail has an outdoor classroom and such natural features as:

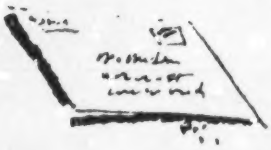
(A) Wildlife
(B) Fallen logs
(C) Tree stumps
(D) Fungi Growth
(E) Moss carpets
(F) Tree species
(G) Wild flowers
(H) Fern beds
(I) Animal dens
(J) Animal trails
(K) Bird nests
(L) Insect activity
(M) Rock exposures
(N) Streams
(O) Marshes
(P) Wood piles
(Q) Fences
(R) Animal tracks

We would like to suggest some ways that you could enjoy the Nature Trail to the fullest extent, and ask that you please leave it the way you found it for the next group.

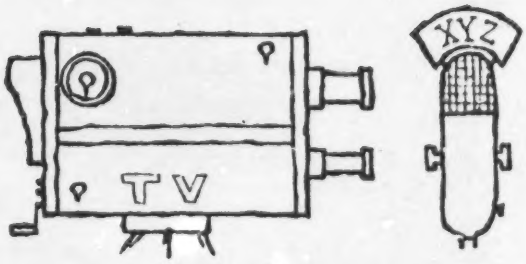
(1) Keep your group together at all times.
(2) Discourage littering (PLEASE)
(3) No smoking
(4) Discourage taking any materials from the nature trail area, such as ferns, moss, rocks, sticks, plants, animals, insects, etc.
(5) We would urge that you take time at each station to read signs and give students time for questions.

We would like to have you visit Crest Nature Trail and would be glad to have one of our students serve as a guide to help you with any questions you might have.





SOURCES FOR ENVIRONMENTAL EDUCATION. AIDS



ENVIRONMENTAL EDUCATION AIDS

1. National Audubon Society
   1130 Fifth Avenue
   New York, New York 10028

   Nature Center Portfolio - includes following which can be purchased separately:

   A Nature Center For Your Community, $1.00
   Planning a Nature Center, $2.00
   Manual of Outdoor Conservation Education, $2.00
   Trail Planning and Layout, $2.50
   Wildlife Habitat Improvement, $2.50
   Manual of Outdoor Interpretation, $3.00

2. Boy Scouts of America
   Supply Division
   P. O. Box 521
   North Brunswick, New Jersey 08902

   Ecology and Nature Trail Signs - sets of 5 1/2 x 7" weather-resistant
c cards, suitable for use inside or out. May be used as samples on actually put up as trail labels, $4.00 each - 80-card set

   No. 7167 - Ecology Signs
   No. 12029 - Northeastern and Midwestern States
   No. 12030 - Southern and Gulf Coast States

3. North Carolina Wildlife Resources Commission
   P. O. Box 2919
   Raleigh, North Carolina 27602

   Wildlife in North Carolina - monthly magazine, $1.00/year.

   NCWRC has a series of informational pamphlets (single copies free) about various fish and wildlife species in North Carolina:

   Bird Furniture
   Summer Birds in Your Backyard
   Winter Birds in Your Backyard
   The Catfishes (by J. H. Cornell)
   Carp in North Carolina (by J. H. Cornell)
   The European Wild Boar in North Carolina
   Management of the Ruffed Grouse in North Carolina
   Management of the Wild Turkey in North Carolina
   Management of the Bobwhite Quail in North Carolina
   Management of the White-tailed Deer in North Carolina
   Management of the Eastern Cottontail Rabbit in North Carolina
   Rainbow Trout in North Carolina (by J. H. Cornell)
   The Crappie in North Carolina
   Life History and Management of the Beaver in North Carolina
   Management of the Muskrat in North Carolina
   Facts About Fishes (by Darrell E. Louder)
   Largemouth Bass in North Carolina (by Duane Raver)

4. State Museum - Eugene Upchurch
Box 2281
Raleigh, N. C. 27602

Information Sheets:

"So You Want to Pick Flowers?" (by W. L. Hamnett) - Information on N. C. Wildflowers
"List of Native Plants and Shrubs That Can Be Planted For Bird Food" (by Zora S. Jensen)
"Some North Carolina Fresh-Water Fishes" - color pictures and information on 39 species - 40¢

5. Soil Conservation Society of America
7515 N.E. Ankeny Rd.
Ankeny, La. 50021

Series of comic-style booklets:

- The Story of Land
- The Wonder of Water
- Help Keep Our Land Beautiful
- Making a Home for Wildlife on the Land
- Food and the Land
- Working Together for a Livable Land
- Plants -- How They Improve Our Environment

6. National Association of Conservation Districts
Service Department
P. O. Box 855
League City, Texas 77573

Environmental Action Guide ($5.00/hundred) - Bibliography on conservation and the environment.

Environmental Film Service - Catalog of 16mm sound films on conservation subjects ($3.00 - $5.00 service charge.)

7. Environmental Education Center
13 Veterans Drive
Oteen, North Carolina 28805 (704) 298-3707

- Director, Dr. Larry Liggett
- Staff to assist in environmental education in Western North Carolina
- Working primarily in schools in Madison, Buncombe, Haywood, Henderson, Jackson, Polk, and Transylvania Counties.
- Has resource material for teachers, will present programs in schools; and is in the process of developing an outdoor classroom area.

8. U. S. Forest Service
Southern Region

Information Kit

9. Soil Conservation Service

Information Adi No. 11 - Suggestions for features that might be included in Outdoor classrooms

Information Aid No. 10 - Outdoor Conservation Classrooms - Information to aid in developing Outdoor Classroom

Conservation Facts Packet - Useful to distribute many of the SCS publications useful in conservation education.

Area I - Nature Trail Ideas
- Slide Program on Outdoor Classrooms

10. North Carolina Department of Public Instruction
Raleigh, North Carolina 27600

"Teachers' Guide for Environmental Education"

11. Plant Mounts for identification and study - a file of plant leaves flowers, and fruits mounted on cardboard under adhesive, clear plastic is useful in teaching the species commonly occuring in the area.

You may find the adhesive acetate locally or it can be ordered from:

IDEAS AND NOTES
Outdoor Recreation and Applied Ecology Workshop
Charles D. Owen High School, Swannanoa, North Carolina

1. NORTH CAROLINA PUBLIC SCHOOLS, a publication, Vol. 37, No. 4, Summer 73, see p. 3, p. 13, Write: Editor, N. C. Public Schools
Division of Public Information
Room 352
State Department of Public Instruction
Raleigh, N. C. 27611

2. Catalogs: Ben Meadows Company (forestry and engineering supplies)
P. O. Box 8377 Station F
553 Amsterdam Ave., N.E.
Atlanta, Ga. 30306

3. Books: Yearbook of Agriculture
1971 -- A good Life For More People
1972 -- Landscape For Living

THE NEW YORK TIMES
Encyclopedic Dictionary of the Environment - $10.00
by Paul Sarnoff
Quadrangle Books
New York, N. Y. -- this is excellent

4. Teaching Materials for Loan: State Museum of Natural History
101 Halifax St.
P. O. Box 27647
Raleigh, N. C. 27611

Ask for general information sheet of services available.
" " teacher's information circular.

5. Magazines -- There are many that might be useful in Outdoor Recreation and Applied Ecology, but these are a must:

NATIONAL WILDLIFE Inquire to: Nation Wildlife Membership Services
1412 6th St. N.W.
Washington, D. C. 20036

AMERICAN FORESTS, Inquire to; American Forestry Association
1319 18th St. N.W.
Washington, D. C. 20036

WILDLIFE IN NORTH CAROLINA Inquire to: N. C. Wildlife Resources Commission
Raleigh, North Carolina

IDEAS AND NOTES

TEACHING MATERIALS:

The Ecological Crisis, 6 filmstrips, 3 cassettes, guides, SVE,
Society for Visual Education, Inc.
1345 Diversey Parkway
Chicago, Illinois 60614 - $50.00

MINERAL CONSERVATION TODAY, filmstrip with record and guide, SVE
CONSERVATION FOR TODAY'S AMERICA, filmstrip with record and guide, SVE

ECOLOGY AND AGRICULTURE, a multi-media kit, with five filmstrips, guides - $40.00
and cassette. From: Vocational Education Production
California State Polytechnic College
San Luis Obispo, California 93401

WATER POLLUTION, Filmstrip, tape, guide, from: VEP (above)
CAREERS IN NATURAL RESOURCES MGT., filmstrip, tape, guide, from: VEP

TOWN AND COUNTRY CATALOG OF REAL ESTATE FOR SALE - free on request
From: UNITED FARM AGENCY, INC.
(ask to be put on mailing list) 612 West 47th
Kansas City, Missouri 64112

The following information circulars are from N. C. WILDLIFE RESOURCES COMMISSION, Raleigh, N. C.

The Catfishes
Rainbow Trout in North Carolina
Facts About Fishes
Management of Eastern Cottontail Rabbit in North Carolina
Winter Birds in Your Backyard
Summer Birds in Your Backyard
N. C. Fishing Waters (Nantahala Lake)
Management of the Wild Turkey in North Carolina
Dear Sir: Please Send Me All About Wildlife
The European Wild Boar in North Carolina
Management of the Whitetailed Deer in North Carolina
Management of the Bob White Quail in North Carolina
Life History and Management of the Beaver in North Carolina
The Squirrel (Gray and Fox)
Bird Furniture
The Crappie in North Carolina

Hunting in North Carolina
The Bluegill in North Carolina
Management of the Ruffed Grouse in North Carolina

Some N. C. Freshwater Fishes (has color plates) - 25¢
State Museum Division
N. C. Dept. of Agriculture

Write: President's Environmental Merit Awards Program
Washington, D.C. 20460

IDEAS AND NOTES

Secure catalogs from: Haywood Technical Institute,
Clyde, N. C. 28721
(they have several programs related to Outdoor Recreation and Applied Ecology)

SOUTHEASTERN COMMUNITY COLLEGE,
Whiteville, N.C. 28472
(they have a new program in environmental technology)

MARTIN TECHNICAL INSTITUTE
Williamston, N.C. 27892
(they have fish and wildlife management,etc.)

Subscribe to: Southern Living, 821 N. 19th St. Birmingham, Alabama, 35202, to get addresses of recreation complexes. A wealth of information can be secured in this way for individual student projects. A student might be assigned to arrange for a week's stay somewhere telling everything anyone would want to know about the week's activities.

The texts used at Owen are:
1. Rural Recreation for Profit, Insterstate
2. OUR NATURAL RESOURCES, INTERSTATE
3. FOREST AND FORESTRY, INTERSTATE

There is a wealth of information in booklets, pamphlets, etc. from various agencies in Raleigh It will be well worth your time on your next trip to Raleigh to investigate. Go to the Forestry Division, Travel and Promotion, and Wildlife Division of Conservation and Development in Raleigh. It is the new white office building west of the Legislative Building.

AREA WILDLIFE BIOLOGISTS

Biologists:	Area Code	Phone Number	District
Mr. Dan M. Connelly 200 W. Church St. Edenton, N.C. 27932	919	482-4861	1
Mr. Sam F. Poole 507 Darby St. Kinston, N.C. 28501	919	527-0319	2

Biologists:	Area Code	Phone Number	District
Mr. Charles Woodhouse Holly Springs, N. C. 27540	919	552-4120	3
Mr. Dave Taylor Box 901 Albemarle, N.C. 28001	704	982-3685	6
Mr. Larry Warlick P. O. Box 871 Burlington, N.C. 27215	919	227-7568	5
Mr. Gene Russ General Delivery Elizabethtown, N.C. 28337	919	862-3831	4
Mr. Tom Monschein 128 Sloop St. Elkin, N.C. 28521	919	835-5427	7
Mr. John Collins Route 7, Box 627 Morganton, N.C. 28655	704	437-7082	8
Mr. A. E. Amons P. O. Box 417 Lake Junaluska, N.C. 28745	704	627-6474	9

LOCATION OF

SOME

OUTSTANDING

NATURE TRAILS

LOCATION OF OUTSTANDING NATURE TRAILS

OUTDOOR RECREATION AND APPLIED ECOLOGY DEMONSTRATION CENTERS:

SCHOOL	LOCATION	CONTACT PERSON
Plymouth High School	Plymouth, N. C.	Neal Brown
North Lenoir High School	La Grange, N. C.	Roy Eubanks
Southern Nash High School	Bailey, N. C.	John Wells
East Montgomery High School	Biscoe, N. C.	Fred Bailey
Southern Alamance High School	Graham, N. C.	Alton Wilson
Crest High School	Shelby, N. C.	Carl DeBrew
East Surry High School	Pilot Mountain, N. C.	James Wilburn
Charles D. Owen High School	Swannanoa, N. C.	Bob Goodson
OTHER:		
Granite Falls Elementary	Granite Falls, N. C.	L. E. Cagle
Environmental Education Center	Salisbury, N. C.	Nancy Raynor
Northwest High School	Littleton, N. C.	Mac Edwards
Surry Central High School	Dobson, N. C.	Don Vestal
South Johnston High School	Benson, N. C.	Bob Hardie
Independence High School	Charlotte	Jerry Taylor